

Performance Graded Asphalt Binder Quality Control/Quality Assurance Program

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Compiled by the
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Revisions

See the website for the latest revision updates:

Click on <https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Order=MM-02-06> then scroll down to “Programs” and click the document titled Performance Graded Binder QC-QA Program Revisions.

I. GENERAL DESCRIPTION

The Performance Graded Asphalt Binder (PGAB) Quality Control (QC)/Quality Assurance (QA) Program is designed to give Producers/Suppliers [henceforth Producer designates Producer/Supplier] more responsibility for controlling the quality of material they produce and to utilize the QC information they provide in the acceptance process by the North Carolina Department of Transportation (NCDOT). It requires Producers to perform QC sampling, testing and record keeping on materials they ship for use by the NCDOT. In addition, the Producer is required to participate in Independent Assurance (IA) sample activities described in Section III (D). Also, it requires the NCDOT to perform QA verification sampling, testing and record keeping confirming the performance of the Producer's quality control plan. The types of samples and the lot sizes required will be described in detail later in this document.

The word "lot" and "batch" will have the same meaning and are congruous throughout this document. It is the intent of this program that acceptance or rejection of material be based on the total program. Therefore, a comparison of the QC sample, QA verification, and other sample data may be used by the NCDOT for acceptance or rejection of a lot of material.

Participation in this program does not relieve the Producer of the responsibility of complying with all requirements of the *NCDOT Standard Specifications for Roads and Structures*. See Appendix X for a posting from the Federal Highway Administration.

II. PROGRAM REQUIREMENTS

A. Basic Requirements

There are two basic requirements for Producer's facility approval. The Producer's facility must have an approved in-house QC PGAB plan that meets the requirements of AASHTO R 26 Section 9 and must use an AASHTO re:source (formerly AMRL) approved laboratory conforming to applicable sections of AASHTO R 18. See Section II (c). References to the word "lot" in AASHTO R 26 or other specification documents and the word "batch" used by NCDOT have the same meaning and are congruous.

B. QC Plan

The program requires that the Producer have a QC plan that meets the requirements of Section 9 of AASHTO R 26 (Standard Practice for Certifying Suppliers of Performance Graded Asphalt Binders). This is a comprehensive standard complete with guidelines. A Northeastern User's Producer's Group (NEAUPG) Model QC plan has been provided as a guide in Appendix I (website). Appendix II has Section 1020 of the NCDOT Specifications (website).

C. Approved Laboratory

The Program requires all tests associated with the testing of asphalt binder to be conducted at an AASHTO re:source (formerly AMRL) accredited laboratory conforming to the applicable sections of AASHTO R 18 that is qualified in the following procedures in Table 1 below. All equipment used at that laboratory is calibrated and maintained per AASHTO R 18. For information on how to become an accredited laboratory contact AASHTO or visit their website at <http://aashtoresource.org/>.

TABLE 1	Required Tests
<u>Test Description</u>	<u>Test Method Reference</u>
Flash Point (Cleveland Open Cup)(Degrees Centigrade)	AASHTO T 48
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G*/sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (Mpa)	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
Direct Tension (DTT) Failure strain (%)	AASHTO T 314
High End Temperature True Grade (°C)	AASHTO T 315

D. Plant Approval Process

The approval process requires the Producer to write the State Materials Engineer at NCDOT, 1801 Blue Ridge Road, Raleigh, NC 27607, requesting that the plant be considered for acceptance into the program. It must identify the specific products that are to be produced. Two copies of the Producer's written QC plan must be submitted with the request for approval.

The NCDOT will review the Producer's written QC plan and if it is approved, an on-site inspection will be scheduled. This on-site inspection will verify that the Producer's QC plan has been implemented and is being followed. If either the Producer's QC plan or laboratory does not meet NCDOT requirements, the Producer will be informed of the deficiencies in writing. Once the deficiencies have been addressed, the Producer may again request approval in writing to the State Materials Engineer.

E. Certification for Participation in the QC/QA Program

If the NCDOT has approved the Producer's written QC plan and the on-site inspection confirms that the initial program requirements have been met, NCDOT will certify the Producer for participation in the program. At the end of the year, and each subsequent year, NCDOT will approve participation for the upcoming year once a letter certifying/updating the Producer's QC plan for the coming year has been received and any necessary inspections are made. Any time changes are made documentation in the form of a letter from the Producer shall be provided to the Materials and Tests Unit. Random inspections may be conducted at any time by NCDOT to verify compliance with the program requirements. Failure to perform all of the program requirements may result in a Producer being removed from the Program.

F. Statement of Remediation

In the event that material not meeting specification is shipped, the NCDOT will be immediately notified and pavements (if any) constructed from the material may be rejected and removed from the site unless otherwise permitted by the Engineer in accordance with Article 105-3 of the Standard Specifications, CONFORMITY WITH PLANS AND SPECIFICATIONS.

III. SAMPLING AND TESTING PROCEDURES

A. Producer's QC

The Producer's QC samples are used by the Producer to monitor the quality of material being produced and shipped. Materials will be sampled in accordance with AASHTO R-66, Sampling Asphalt Materials, except that samples may be taken from a single valve near the

bottom of the tank. Upon acceptance into this program, the Producer's technically competent sampling personnel will be evaluated and inspected on sampling procedures by NCDOT initially and then subsequent 60 month intervals. A certificate will be issued by NCDOT to the person evaluated. In the event Producer's personnel are discharged from duty or leave, the Producer shall contact the NCDOT Asphalt Inspector to schedule an evaluation of any new employee(s) hired. See Appendix IV, Sampling Procedures and Appendix VIII, Technician Training and Evaluation Record.

1. Sampling for QC

The following protocol will certify that the materials tested meet NCDOT specifications.

In accordance with AASHTO R-66, Sampling Asphalt Materials, except that samples may be taken from a single valve near the bottom of the tank, the Producers' facility's technically competent personnel [as described in their QC plan] will take two-1 quart samples in an appropriate sealed container of each batch and PGAB grade available on any given day. A Producer Sampling Log and Lab Results form shall be filled in and filed onsite and available for inspection at any time. Requirements for the Producer Sampling Log and Lab Results form are in Appendix VII.

- One sample, henceforth designated as "A", is for the Producer's AASHTO M-320 QC tests performed on site or at the accredited lab. "A" has a unique NCDOT Batch number.
- The other sample designated and labeled "B" is to be stored in an appropriate temperature controlled storage room at the facility that is kept between 40 degrees

F (4.4 degrees C) and 100 degrees F (37.8 degrees C). These samples may be tested by the NCDOT in case of dispute.

- “B” has the SAME Batch number as “A”.
- The NCDOT will monitor the “B” samples and will instruct the competent person when to discard the “B” samples. The discard interval will be no less than 90 days after the sampling date.

The QC samples taken by the Producer are to be identified with the following information on the sample container. The Producer will furnish and affix a label to each container itself, not on the lid, with the following information to identify the material.

1. Sampled By: _____
2. Date / Time Taken __/__/__:__ am/pm
3. NCDOT#QC-xxxxxxx _____
4. Facility:AT- _____
5. Tank/Car#: _____
6. Grade: _____ Rep. Qty. _____
7. ID: ____ (A=Prod/Supp, B=Retain)
8. “By providing this data under my signature, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of data, in any manner, has occurred.”
9. Sampler’s Signature: _____

In general, this is similar to the information that is on NCDOT’s self-adhesive labels [Appendix III] that will be used on the sample container for the QA verification sample identification. For more information on sequential batch numbers to be used for sample identification see section III (B).

2. Accessibility to Facility and Random Visits by NCDOT

The above sampling rate does not preclude the NCDOT from taking additional random samples. Materials and work areas shall be accessible. The procedures and times of inspection shall be agreed upon by the NCDOT and the Producers' technically competent person who shall accommodate the NCDOT for said purpose.

3. Producer's Test Report

See Appendix VI that has a list of the minimum required information to be included on a PGAB test report. [Table 1](#) in Section II (C) contains the required tests. High End Temperature True Grade is required and any material that does not meet the required grading shall be noted on the test report as "DOES NOT MEET TRUE GRADING: Product not acceptable for use per the North Carolina Performance Graded Asphalt Binder Quality Control/Quality Assurance Program." Samples are to be tested at the rate set forth in the Producer QC Plan. Test results are to be submitted to the NCDOT by means described in III (B)(2). Test reports shall also indicate the corrective action taken to resolve product failures. No information on a test report shall contain whiteout used to neither obscure original information nor shall pencil be used anywhere on the report. If corrections are needed unused information should be x-ed or lined out with only one X or line and then initialed. If a corrected report is sent out after the original report it shall have the words "Corrected Report" clearly written on it. Falsification of test results, documentation of observations, records of inspection, adjustments to the process, discarding of samples and/or test results, or any other deliberate misrepresentation of the facts will result in revocation of the certified technician's authority to certify PGAB test results or reports for NCDOT.

4. Consequences of Falsification of Test Results

No payment will be made for all tonnage represented by the falsified test(s) results or documentation. In addition, state and/or federal authorities may also pursue legal action.

5. Notification of Product Failure

This subject is addressed in Section 2.1 of any Producer's QC plan on file at NCDOT.

6. Standard Specifications

The Producer is to perform all sampling and testing in accordance with current specifications and procedures referenced in the *NCDOT Standard Specifications for Roads and Structures*.

B. Sample Identification and Record Keeping for All Producer Material

It is critical that care be taken to properly label samples and record test data accurately.

NCDOT will furnish each producer a series of sequential numbers. Producer's QC material will then be identified with sequential Batch numbers (e.g., NCDOT#QC-1200146, QC-1200147, etc) at the beginning of each thirty (30) day period during the year. Skipping or repeating batch numbers when identifying material to be certified by the Producer will not be permitted as this will create confusion in this process.

1. Bill of Lading Requirements

An example Bill of Lading must be included with the QC Plan. The delivery ticket or bill of lading information below is extracted from the North Carolina Department of Transportation Standard Specifications for Roads and Structures Section 1020-1, Delivery and Acceptance of Asphalt Materials which describes the transporting requirements. The Bill of Lading or delivery ticket will have a minimum of the following information on it.

1. Name of Producer/Supplier and location
2. A statement that the material has been tested and meets AASHTO specifications or is being provided by an approved supplier under Approved Supplier Certification (ASC)
3. The grade of the binder material.
4. The rotational viscosity in Pascal-Seconds (Pa-S) at 135 and 165°C
5. The recommended laboratory mixing and compaction temperature (degrees C for the PGAB)
6. Delivery ticket number
7. Date and time loaded (mm/dd/yyyy AM:PM)
8. Date and time shipped (mm/dd/yyyy AM:PM)
9. State project or purchase order number
10. NCDOT assigned batch number
11. Destination
12. Name of consignee
13. Trailer or car number
14. Producer's or Supplier's storage tank and batch number
15. Quantity loaded in tons or gallons (metric tons or liters)
16. Specific gravity or pounds per gallon (kg/L) at 60 degrees F (15.6 degrees C)
17. Loading temperature
18. Net gallons at 60 degrees F (15.6 degrees C)
19. Brand, grade and percentage or quantity of anti-strip additive
20. Stamp, write, print or attach the NCDOT Supplier's and NCDOT Transporter's Certification to the delivery ticket as described in Section 1020, Delivery and Acceptance of Asphalt Materials. For the latest issues of certifications, see the Materials and Tests website. Click on <https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Order=MM-02-06> then scroll down to "Program Forms" and click the document titled Asphalt Materials Bill of Lading Standard Attachment.

Other information may be added as deemed necessary.

2. Retention and Reporting of Data

- QC producer test data, Certificate of Analysis (COA) and Certificate of Compliance (COC) test data is to be retained by the Producer for at least three (3) years and made available for review to the NCDOT and Federal Highway Administration (FHWA) upon request. Bill of Lading and Loading affidavits are to be retained by the Producer for at least 6 months and made available to the NCDOT upon request. See Appendix VI that has a list of the minimum required information to be included on a PGAB test report or COA. Quality Control COA's or COC's and/or PGAB test reports shall include the NCDOT Batch number identification and shall be faxed to the NCDOT at 919-733-8742 with a cover sheet to the attention of Asphalt Binder QCQA program or emailed to AsphaltQCQA@ncdot.gov .
- Submission of certified test data to the NCDOT shall also be done by populating the spreadsheet shown in Appendix XI. No header changes to the spreadsheet are permitted. Email this data to the above email address with the subject line "PGAB data-AT xx". No signature is required on this spreadsheet but the data will be cross-checked with the certified test data received from Producers.

C. Quality Assurance (QA) and Sampling and QC/QA Results Evaluation

The QA samples taken by the NCDOT Inspector from the Materials and Tests Unit or other qualified individual are used by the NCDOT to accept the quality of material being produced and shipped. Materials will be sampled in accordance with AASHTO R-66, Sampling Asphalt Materials, except that samples may be taken from a single valve near the bottom of the tank.

1. Verification Sampling by QA Personnel

In accordance with AASHTO R-66, Sampling Asphalt Materials, except that samples may be taken from a single valve near the bottom of the tank, the NCDOT shall take verification samples, random and independent of QC samples, of PGAB at the rate of one – 1 quart samples at random once each two months or 20,000 tons (4,620,000 gallons) per grade per lot whichever is less until three consecutive results comply with the program requirements. The Producer may draw a sample at the same time as a duplicate to hold for possible future testing, *but it should never be used as a required QC sample as it is not taken at random.* NCDOT will affix a label to each container itself, not on the lid, to identify the material. An example of the label is in Appendix III.

- The sample is for NCDOT and has the same batch number as the last QC sample taken by the producer.

Upon return to the laboratory NCDOT will record the sample information on a HiCAMS Sample Card Record (See Appendix VII) and assign the HiCAMS number. The QA verification sample will be tested by the NCDOT in accordance with AASHTO M 320.

2. Accessibility to Facility

The above sampling rate in III (C)(1) does not preclude the NCDOT from taking additional random samples. Materials and work areas shall be accessible to the NCDOT. The procedures and times of inspection shall be coordinated by the NCDOT and the Producers' technically competent person who shall accommodate the NCDOT for said purpose.

3. QC Sample and QA Verification Sample Results Evaluation

The following are definitions that may/may not be industry standard but will be used by the NCDOT in this program.

- Batch – a representative quantity of PGAB that has an NCDOT Batch number assigned to it.
- Set of QC results - all the QC test results for one grade of PGAB during the QA inspection interval of 2 months or 6 months as described in this section.
- Verification – sample taken for verification of Quality Control’s testing.
- Acceptance Limits, Historical – FOR INVESTIGATION USE REFERENCE BY NCDOT -a statistical low or high number, with a specification on either side, is a three deviation numerical value determined by the applicable test method.
 - High End Temperature True Grade - high temperature grading result determined from DSR-original and DSR-RTFO, where the more restrictive of the two parameters is selected. If the DSR-O has a pass/fail temperature less than DSR-RTFO, then the DSR-O temperature is reported.

For each batch of a grade tested over the QC or QA inspection interval, the set of results for a PGAB sample grade must meet AASHTO M320 specifications and classify as that PGAB grade per the High End Temperature True Grade test to limit the risk to DOT on projects. In the event of recognition of the material failing or grading at a level beyond the high end temperature true grade or grading result, the AMRL lab shall contact the terminal personnel immediately to avoid shipments. The responsible AMRL lab MUST PLACE A COMMENT on the test report that states, “DOES NOT MEET SPECIFICATIONS OR TRUE GRADING: Product not acceptable for use per the North Carolina Performance Graded Asphalt Binder Quality Control/Quality Assurance Program.” For additional information for material that deviates from specifications, see section III (C)(5) (a).

**4. Table 2 – Historical Acceptance Limits of QC-QA Samples – All Producers -
FOR INVESTIGATION USE REFERENCE BY NCDOT**

Note for Table 2: Acceptance limit values subject to change.

See the website for the latest updates: Click on

<https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Order=MM-02-06> then scroll down to “Programs” and click the document titled Performance Graded Binder QC-QA Program Table 2 Acceptance Limits.

**5. Corrective Action and Investigation by the Producer and NCDOT on QC and QA
Verification Samples**

a. Deviation from Specification and Sample Fails by One or Both Labs

For deviations from specifications or where true grading specifications are not met by one or both of the accredited testing facilities, the Producer will stop shipment and immediately notify the NCDOT within 24 hours or the NCDOT will notify the Producer to stop shipment. At this point, an investigation involving the Authorized Quality Control (QC) Representative described in the Producer’s QC Plan and the NCDOT will attempt to resolve the problem. One or both parties will repeat the tests on the retained sample and if they are then in range of specifications, the results are reported and shipment resumes. If any of the tests still fail from either lab, both parties will conduct an investigation that will include but is not limited to review of the sampling procedures, the equipment used in the production and the testing of the material, the test results and the testing procedures of the technician. If the cause is determined to be improper sampling or testing procedures by the Producer the following will occur.

- The appropriate approved individual will be notified.
- If corrective action is not taken, the individual’s approval may be revoked.

If the cause is determined to be in the Producer's testing equipment or handling of the material, the following will occur.

- The Producer is to take corrective action.
- If corrective action is not taken, the Producer's approval to provide material to the NCDOT may be revoked.

The corrective action taken will be documented by the Producer and with a copy sent to the NCDOT. Test reports shall also indicate the corrective action taken to resolve product failure. If the cause is determined to be in the NCDOT's sampling or testing procedures, or equipment, the NCDOT will take corrective action. If the investigation above fails to determine the cause then the third referee sample retained by NCDOT will be sent to a mutually acceptable AASHTO accredited laboratory for third party analysis.

- Responsibility for payment to the third party lab belongs to the Producer unless results show that NCDOT's results were not within specifications.
- If the third party's results indicate failing material from the referee sample, shipments from that batch will be discontinued and/or rejected.

Quality Assurance verification sample testing will be resumed at a one-month interval until three consecutive lots meet the specifications. Once the investigation concludes and any corrective action implemented, normal testing procedures are resumed.

b. Consequences of Providing Failing Material to NCDOT

If the material fails to meet AASHTO's grading specifications for any test performed, the material is not acceptable and will be subject to Section II (F) of this written program.

D. Independent Assurance (IA) – Comparative

1. Comparative Sampling for IA

The IA – comparative-sampling protocol evaluates the qualified sampling and testing personnel and testing equipment. The Producer is to take samples for EACH of the accredited labs that they use for certifying PGAB. In accordance with R-66, Sampling Asphalt Materials,, except that samples may be taken from a single valve near the bottom of the tank, the Producers’ facility’s technically competent personnel [as described in their QC Plan] will take Independent Assurance (IA) comparison samples of PGAB at the rate of two – 1 quart comparative samples at random twice each year of performance graded asphalt binder. More than one “A” sample may be taken depending on the number of laboratories being evaluated. Only one “B” sample is needed for NCDOT. For example, if there are five accredited labs used by a producer, there needs to be six samples taken (five for the producer’s use, one for NCDOT). Samples are to be taken at the same time (back to back) and do not need to be physically split from a one- (1) gallon container. A Producer Sampling Log and Lab Results form shall be filled in and filed onsite and available for inspection at any time. The IA samples taken by the Producer are to be identified with the following information on the sample container. The Producer will furnish and affix a label to each container itself, not on the lid, with the following information to identify the material.

1. Sampled By:_____
2. Date/Time Taken __/ __/ ____: __am/pm
3. NCDOT#IANC-xxxxxxx_____
4. Facility:AT-_____
5. Tank/Car#:_____
6. Grade:_____Rep. Qty. _____
7. ID:_____ (A=Prod/Supp,B=DOT)

8. “By providing this data under my signature, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of data, in any manner, has occurred.”
9. Sampler’s Signature: _____

In general, this label is similar to the information that is on NCDOT’s self-adhesive labels [Appendix III] that will be used on the sample containers for the QA verification sample identification. For more information on sequential batch numbers to be used for sample identification see section III (B).

- Samples designated with an “A” are always the Producer’s. “A” has a unique NCDOT Batch number. Each of the Producer’s accredited labs receives an “A” sample. The sequence “A1, A2, A3, ...” may be used.
- “B” is for NCDOT and has the same batch number as “A”. A HiCAMS number will be assigned at the QA laboratory.

The NCDOT batch number will be assigned by the Producer from their sequential list.

Then the Producer will send sample “B” to the NCDOT. The Producer’s IA sample results can serve as that month’s grade certification. The sample will be tested by the NCDOT and by the Producer’s designated AASHTO accredited laboratory in accordance with AASHTO M 320. Reporting of the IA test results by the Producer to DOT shall be in accordance with Section III(A)(3) and Appendix VI.

2. IA – Comparative Sample Results Evaluation

The following are definitions that may/may not be industry standard but will be used by the NCDOT in this program.

- Batch – a representative quantity of PGAB that has an NCDOT Batch number assigned to it.
- Set of IA results - all the IA test results for one grade of PGAB during the inspection interval of twice per year as described in this section.

- Verification – sample taken for verification of Quality Control’s testing.

For the batch of a grade tested by the Producer over the inspection interval, the set of IA results are compared to the corresponding NCDOT IA sample to precision statements in Table 3.

3. Table 3 – Acceptable Range of Two Test Results

<u>TABLE 3</u>		<i>Acceptable Range of Two Test Results</i>
Condition:	(D2S%) *	Test Method Reference:
<i>Multilaboratory Precision:</i>		
Rotational Viscosity (Pa-s)	12.1	AASHTO T 316
Original Binder: G*/sin delta (kPa)	17.0	AASHTO T 315
RTFO/TFO Residue: G*/sin delta (kPa)	22.2	AASHTO T 315
PAV Residue: G*/sin delta (kPa)	40.2	AASHTO T 315
BBR Creep Stiffness (Mpa)	17.8	AASHTO T 313
BBR Slope -m value	6.8	AASHTO T 313

Note: * D2S% values subject to change and is defined as the difference between two individual test results expressed as a percent of average.

4. Corrective Action and Investigation by the Producer and NCDOT on IA – Comparative Samples

a. Deviation from Precision Requirements in Table 3

For deviations from the precision statements in Table 3, the NCDOT will notify the Authorized Quality Control (QC) Representative described in the Producer’s QC Plan. IANC samples will be resampled by the Producer in accordance with Section III (D)(1) except NCDOT receives 4 (FOUR) IA samples. Both parties will repeat testing and if they are in range of method reproducibility limits, results are reported. If the reproducibility is not acceptable from the second set of test results, then a retain from NCDOT will be sent to a mutually acceptable AASHTO accredited laboratory. If the results from the referee (third lab) are not within the reproducibility in Table 3

when compared to the highest and lowest of the three lab values, an investigation will be made to determine the cause of the discrepancy. The NCDOT will allow no more than sixty calendar days for the Producer to submit documentation that will complete the investigation. After that period, action may be taken which could include removal from the approved list. The investigation will include but is not limited to a review of the sampling procedures, the equipment used in the production and the testing of the material, the test results, and the testing procedures of the technician. If the cause is determined to be improper sampling or testing procedures by the Producer or the NCDOT, the appropriate approved individual will be notified. If the problem continues, the individual's approval may be revoked. If the cause is determined to be in the Producer's testing equipment or handling of the material, the Producer is to take corrective action. If this problem continues, the Producer's approval to provide material to NCDOT may be revoked. The Producer will document the corrective action taken with a copy sent to NCDOT. Test reports shall also indicate the corrective action taken. If the cause is determined to be in the NCDOT's sampling and testing equipment, the NCDOT will take corrective action.

- Responsibility for payment to the third party lab belongs to the Producer unless results show that NCDOT's results were beyond the reproducibility limits (Table 3)

If the third party's results indicate failing material from the referee sample, shipments from that batch will be discontinued and/or rejected. Once the investigation concludes and any corrective action implemented, normal testing procedures are resumed.

IV. Product Identification Procedures

In addition to the identification required by the applicable AASHTO specifications, the Producer's QC Plan, and by the NCDOT Standard Specifications, the PGAB Bill of Lading shall be marked as having been produced as a participant of this program. All Bills of Lading are required to have NCDOT sequential batch numbers that will fulfill this marking requirement. HiCAM's numbers are not required on bills of lading.

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Appendix I: Example Model Performance Graded Binder Quality Control Plan

See the website for the latest updates:

Click on <https://connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx?Order=MM-02-06> then scroll down to “Programs” and click the document titled Performance Graded Binder QC-QA -NEAUPG Model Plan.

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Appendix II: NCDOT Section 1020

See the website for the latest updates:

Click on <https://connect.ncdot.gov/resources/Specifications/Pages/default.aspx> then scroll down to select the latest Standard Specifications and Provisions heading.

Appendix III: Example Label for Sample Identification



SAMPLED BY: _____
DATE/TIME TAKEN __/__/____: __am/pm
NCDOT# QA- _____
FACILITY: AT- _____
TK/CAR#: _____
GRADE: _____ REP. QTY. _____
ID: _____ (A=Prod/Supp,B=Retain)
****PG BINDER**** HiCAMS # _____

“By providing this data under my signature, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of test results, in any manner, has occurred.”

SAMPLER's Signature: _____

The Batch number will be designated as “NCDOT#QA-xxxxxxx” or “NCDOT#QC-xxxxxxx” or “NCDOT#IANC-xxxxxxx” on the label.

Appendix IV: Sampling Procedures

In order to reduce the number of variables that affect the correlation between QC and QA verification samples and IA comparative samples, it is important that all samples be obtained following procedures outlined in the *Standard Specifications*, or as outlined in this program.

Each Producer will describe in detail the particular sampling and testing procedures used at the facility in the Producer's QC plan including the qualifications of sampling and testing personnel.

Samples taken by NCDOT during facility visits will be taken in the same manner as the QC or IA samples taken at the plant.

Appendix V: Testing Procedures

The following is a partial reference list of common test names used in this manual and their corresponding ASTM or AASHTO designations. This list is not intended to be all inclusive, nor is it intended to be a list of all tests required for certification of the products and materials produced using this program.

QC Tests

<i>Test Description</i>	<i>Test Method Reference</i>
Flash Point (Cleveland Open Cup)(Degrees Centigrade)	AASHTO T 48
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G*/sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (Mpa)	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
Direct Tension (DTT) Failure strain (%)	AASHTO T 314
High End Temperature True Grade (°C)	AASHTO T 315

QA Verification Tests

<i>Test Description</i>	<i>Test Method Reference</i>
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G*/sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (Mpa)	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
Direct Tension (DTT) Failure strain (%)	AASHTO T 314
High End Temperature True Grade (°C)	AASHTO T 315

Appendix V: Testing Procedures (Continued)

Independent Assurance (IA) Tests

<i>Test Description</i>	<i>Test Method Reference</i>
Rotational Viscosity @ 135 C (Pa-s)	AASHTO T 316
Rotational Viscosity @ 165 C (Pa-s)	AASHTO T 316
Original Binder: G*/sin delta (kPa)	AASHTO T 315
Rolling Thin Film Oven Test (RTFO)	AASHTO T 240
Mass Change after RTFO (%)	AASHTO T 240
RTFO Residue: G*/sin delta (kPa)	AASHTO T 315
Pressure Aging Vessel (PAV)	AASHTO R 28
Pressure Aging Vessel (PAV) Residue: G*/sin delta (kPa)	AASHTO T 315
Bending Beam Rheometer (BBR) Creep Stiffness (Mpa)	AASHTO T 313
Bending Beam Rheometer (BBR) Slope -m value	AASHTO T 313
High End Temperature True Grade (°C)	AASHTO T 315

Appendix VI: QC and QA Verification Test Report Forms

Each Producer will submit copies to NCDOT of all final QC and QA verification test report forms, COA's, and COC's used with the Producer's QC plan or with this QC/QA plan.

Test reports, including IA, shall contain at a minimum the following information:

- A. Certifying statement with signature on the test report or COC/COA. This statement must read as follows:
"By providing this data under my signature, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of test results, in any manner, has occurred."
- B. Name and address of the testing laboratory.
- C. The facility or terminal who owns the sample.
- D. Unique report identification number and/or title and the date issued.
- E. Identification of the NCDOT QC or QA verification North Carolina batch number.
- F. Description, identification, and condition of the test sample.
- G. Date and time the sample was taken.
- H. Sampled By.
- I. Tank or car number.
- J. Grade of asphalt that is being tested.
- K. Date of receipt of the test sample.
- L. Date(s) of test completion.
- M. Identification of the standard test method used and a notation of all known deviations from the test method.
- N. Test results and other pertinent data required by the standard test method.
- O. Identification of any test results obtained by a subcontractor and the name of the subcontractor.
- P. Name of the person(s) accepting technical responsibility for the test report.
- Q. Technician's name
- R. Signature.
- S. Certifying statement that the material meets AASHTO specifications.
- T. Certifying statement that the material DOES NOT MEET SPECIFICATIONS OR TRUE GRADING when a high temperature true grade is performed and is out of range or other deviation from specifications. See Section III (C)(3).

Appendix VII: HiCAMS Sample Card Record and Requirements for Producer Sampling Log and Lab Report

I. NC DOT HiCAMS Sample Card

* Required Field † May Be Required Based on Material		HICAMS #: 	
* Material: _____		<input type="checkbox"/> Metric <input type="checkbox"/> English	
† Sample Owner: _____	† Contract #: _____		
* Testing Category: _____	Field ID: _____		
Check Sample? Y N (circle One)	Proj/Po/Wo#: _____		
† Related Sample ID: _____	Line Item #: _____		
† Corr. Sample ID: _____	RE: _____		
# of Pieces: _____	* Rep. Qty: _____		
* To Be Used In: _____			
Comment:			
* Sampled Date: _____		* Sampled By: _____	
* Sample From: _____	Truck/ Container #: _____		
Structure Number: _____	Route Desc: _____		
Route Type: I US NC SR (circle one)	Alignment: _____		
Route Number: _____	*Location: _____	Offset Dist: _____	
Map Number: _____	*Sta. From: + _____	Sta. To: + _____	
County: _____	Coastal Plain: Y N (circle one)		
† Producer/Supplier: _____	† Plant ID#: _____	<input type="checkbox"/> Approved <input type="checkbox"/> Other	
† Brand Name: _____	Shelf Life Date: _____		
† Date Produced: _____	† Asphalt Mix/ JMF ID: _____		
† Concrete Mix: _____			
† Alternate IDs Type:	Prefix:	Range:	Description of Items:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Please use reverse side for test data, comments, and additional information. Check here if more on reverse <input type="checkbox"/>			

II. Requirements for Producer Sampling Log and Lab Report

The minimum information required is as follows:

1. Terminal name and location
2. Tank Number.
3. Performance Grade
4. Date
5. Time
6. NCDOT QC- or NCDOT IA-
7. Flashpoint
8. Rotational Viscosity @135C
9. DSR on Original @ required Temperature(s).
10. DSR Temperature
11. Mass Loss Percent
12. DSR on RTFO @ required temperature(s).
13. DSR on PAV @ required temperature(s).
14. Pass/Fail Temperature (High End Grade)..
15. BBR on PAV @ required temperature(s).

Optional Fields Below:

16. Specific Gravity @ 60F
17. Elastic Recovery
18. Direct Tension @ required temperature(s).
19. Absolute Viscosity @ 140F
20. Penetration 2hr or 4 hr
21. Terminal / Refinery Lot No.

Appendix VIII: Technician Training and Evaluation Record

Date: _____		TECHNICIAN TRAINING AND EVALUATION RECORD M&T Form 521			
Technician: _____					
Test Method	Check One		Evaluated By	Date	Comments/Results
	Initial Training & Eval.	60 month Eval.			

APPENDIX IX: Producer Historical Acceptance Limits for PGAB Test Methods

This is an EXAMPLE ONLY of typical producer specific acceptance limits.

Type/Item/ Grade:	Facility Name	Upper and Lower Limit of Test Values	Result
PG 64-22	XYZ (#999)	Upper AL of RV @ 135 C (275F)[Pa-sec]:	3.00
PG 64-22	XYZ (#999)	Lower AL of RV @ 135 C (275F)[Pa-sec] :	0.367
PG 64-22	XYZ (#999)	Upper AL of DSR Original @ 64 C [kPa]:	2.35
PG 64-22	XYZ (#999)	Lower AL of DSR Original @ 64 C [kPa]:	1.00
PG 64-22	XYZ (#999)	Upper AL of DSR RTFO @ 64 C [kPa]:	7.34
PG 64-22	XYZ (#999)	Lower AL of DSR RTFO @ 64 C [kPa]:	2.20
PG 64-22	XYZ (#999)	Upper AL of DSR PAV @ 25 C [kPa]:	5000
PG 64-22	XYZ (#999)	Lower AL of DSR PAV @ 25 C [kPa]:	1360
PG 64-22	XYZ (#999)	Upper AL of BBR @ -12 C,S [MPa]:	300
PG 64-22	XYZ (#999)	Lower AL of BBR @ -12 C,S [MPa]:	68
PG 64-22	XYZ (#999)	Upper AL of BBR @ -12 C, m-value:	0.394
PG 64-22	XYZ (#999)	Lower AL of BBR @ -12 C, m-value:	0.300

Appendix X: Federal Highway Administration Poster
(NEXT SHEET)



Department
of Transportation
United States of America

NOTICE

The highway construction underway at this location is a Federal or Federal-aid project and is subject to applicable State and Federal laws, including Title 18, United States Code, Section 1020, which reads as follows:

“Whoever, being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm or corporation, knowingly makes any false statement, false representation or false report as to the character, quality, quantity, or the cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the costs thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction of any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever, knowingly makes any false statement, false representation, false report, or false claim with respect to the character, quality, quantity or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to a material fact in any statement, certificate, or report submitted pursuant to the provisions of the Federal-Aid Road Act approved July 11, 1916 (39 Stat. 355) as amended and supplemented,

Shall be fined under this title or imprisoned not more than five years, or both.”

Any person having reason to believe this statute is being violated should report the same to the agency representative(s) named below.

(Federal-aid Projects Only)
State Highway Department

Michael L. Holder, PE
NCDOT – Chief Engineer
1536 Mail Service Center
Raleigh NC 27699-1536

(Both Federal and Federal-aid Projects)
Federal Highway Division Administrator

John F. Sullivan, III, PE
FHWA – NC Division
310 New Bern Avenue, Suite 410
Raleigh, NC 27601-1418

(Both Federal and Federal-aid projects)

Department of Transportation
Office of Inspector General
Toll Free Hotline
1-800-424-9071

APPENDIX XI: Spreadsheet for PGAB Test Data for Submitting to NCDOT

Sampled Date	Test Completed Date	ID No.:	Test Comment	Sample Status	Material Description	Type/Item/Grade:	Sampled By	Sample From	Sample Location Details	Facility Name	Producer Name	RV @ 135 C (275F)[Pa-sec] :
5/18/2004	5/24/2004	QC-1600001	EXAMPLE	Meets Specs	Asphalt Binder, PG 70	PG 70-22	Doe, John	Tank	67	XYZ, NC (#16)	XYZ	0.563
QC-												

RV @ 165 C (329F)[Pa-sec] :	DSR Original @ 58 C [kPa]:	DSR Original @ 64 C [kPa]:	DSR Original @ 70 C [kPa]:	DSR Original @ 76 C [kPa]:	DSR RTFO @ 58 C [kPa]:	DSR RTFO @ 64 C [kPa]:	DSR RTFO @ 70 C [kPa]:	DSR RTFO @ 76 C [kPa]:	DSR PAV @ 31 C [kPa]:	DSR PAV @ 28 C [kPa]:	DSR PAV @ 25 C [kPa]:	DSR PAV @ 22 C [kPa]:	DSR PAV @ 19 C [kPa]:	DSR PAV @ 16 C [kPa]:
			1.56	0.76			3.63	1.74		2768.0	4084.0	5964.0		

DSR PAV @ 13 C [kPa]:	BBR @ -12 C, S [MPa]:	BBR @ -12 C, m-value:	BBR @ -18 C, S [MPa]:	BBR @ -18 C, m-value:	BBR @ -24 C, S [MPa]:	BBR @ -24 C, m-value:	DTT @ -12 C, Strain [%]:	DTT @ -18 C, Strain [%]:	DTT @ -24 C, Strain [%]:	Jnr @ 3.2 [1/kPa]:	Percent Loss/Gain @ 163 C:	High End Temp True Grade [°C]:	Reported By:	Tested By
	223.0	0.303								0.3567	0.111	75.5	J. Doe	J. Doe

Note: Spreadsheets will be submitted by email in Excel format to the QC Administrator of each Producer for distribution.

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